Chapter 1
Introduction

1-1. Purpose

This manual is intended to provide guidance and criteria for the design and selection of small-scale wastewater treatment facilities. It provides both the information necessary to select, size, and design such wastewater treatment unit processes, and guidance to generally available and accepted references for such information. For the purpose of this manual, small-scale wastewater treatment systems are those with average daily design flows less than 379 000 liters per day (L/d) or 100,000 gallons per day (gal/d), including septic tanks for flows less than 18 900 L/d (5000 gal/d), small prefabricated or package plants for flows between 18 900 L/d (5000 gal/d) and 190 000 L/d (50,000 gal/d), and larger prefabricated treatment systems with capacities of no more than 379 000 L/d (100,000 gal/d).

1-2. Applicability

This manual applies to all HQUSACE Commands having responsibility for civil works projects.

1-3. References

Required and related publications are listed in Appendix A.

1-4. Distribution Statement

Approved for public release; distribution is unlimited.

1-5. Laws and Regulations

a. General. The design, construction, and operation of wastewater treatment facilities that either discharge wastewater to surface waters or use natural systems as a disposal method are controlled by Federal, state, and local laws and regulations. The National Pollutant Discharge Elimination System (NPDES) permitting program under the Clean Water Act (CWA) is designed to control wastewater discharges to surface waters. For more details on the laws and regulations governing wastewater discharges, see TM 5-814-8.

b. Army policy. Army policy is to use regional or municipal water supply and wastewater collection and treatment systems, when economically feasible, rather than construct or operate Army water supply and wastewater systems (AR 200-1, Chapter 2-8).

c. State regulations. Table B-1 presents a comprehensive list of state regulatory contacts. A summary of states with regulations regarding land applications for subsurface disposal of wastewater is provided in Table B-2. Table B-3 identifies the states that have developed specific design criteria for wastewater treatment systems. Chapter 10 presents a detailed discussion of applicable Federal sludge disposal regulations, 40 Code of Federal Regulations (CFR) 503.

d. NPDES program.

(1) The NPDES permit process is authorized by Section 402(a)(1) of the CWA. Under the NPDES program, each operator or owner of a wastewater treatment facility desiring to discharge wastewater to surface waters (lakes, rivers, creeks, oceans, etc.) is required to obtain a permit for such activity. The authority to issue permits may be delegated to states meeting certain technical, administrative, and legal requirements. The NPDES program is administered by ten Environmental Protection Agency regions and 35 approved NPDES states as of January 1, 1994 (see Table B-1). The CWA does not preclude state or local authorities from promulgating more stringent standards than those required under the national standards.

(2) The NPDES program in its current form has evolved from a number of legislative initiatives dating back to the mid-1960s. The amendments to the 1972 legislation (Clean Water Act of 1977 and Water Quality Act of 1987) shifted emphasis from controlling conventional pollutants (BOD_5 and TSS) to controlling toxic discharges.

(3) NPDES program authority can be divided into four elements: Municipal and Industrial Permit Program; Federal Facilities Program; Pretreatment Program; and General Permit Program.

(4) The authority to administer the NPDES program to Federal facilities is a programmatic responsibility assigned to NPDES states and also covers any facility that discharges less than 379 000 L/d (100,000 gal/d) of wastewater. Table B-2 identifies the states with NPDES program authority.

In those states where the NPDES permitting authority has not been delegated, the facility will require a state and a Federal permit. In addition, the CWA **(**Section 313(b)(2)**)** added a significant requirement for Federal facilities constructed after September 30, 1979, to evaluate innovative wastewater treatment alternatives. Recycle, reuse, and land treatment technologies are considered as innovative. According to Section 313, innovative technologies must be used unless the life cycle cost of the innovative system exceeds that of the next most cost effective alternative by 15 percent. However, the EPA Administrator has the authority to waive this requirement.

e. Pretreatment program.

(1) The pretreatment program was developed to control discharges to Publicly Owned Treatment Works (POTWs) or those that have the potential to contaminate sewage sludge. The pretreatment program establishes responsibilities of Federal, state, and local government, industry, and the public to implement National Pretreatment Standards to control pollutants which pass through, or interfere with, treatment processes in POTWs or which may contaminate sewage sludge. The regulations developed under the pretreatment program apply to pollutants from non-domestic sources which are indirectly discharged, transported by truck or rail, or otherwise introduced into POTWs.

(2) The term “pretreatment,” as defined in Part 403 of the CWA, means the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to introducing such pollutants into a POTW. The reduction, elimination, or alteration may be accomplished by physical, chemical, or biological processes, process changes, or other means, except as prohibited by CWA **(**Section 403.6(d)**)**. A more detailed discussion on the effects of toxic pollutants on biological treatment processes can be found in TM 5-814-3, Chapter 3.

f. Effluent limitations. The NPDES permit effluent limitations are developed in each site-specific case by three methods: effluent limitations guidelines; water quality considerations; and best professional judgement (BPJ). In general, effluent limitations guidelines are employed in cases where water quality standards are not contravened. Such limitations are technology-based and represent "end-of-pipe" technology. However, the owner or operator of a treatment facility can use any technology that achieves the same effluent quality standards. Many situations require the development of limitations based on water quality considerations. Usually, water-quality based limits are required only for selected parameters which are shown to be toxic to the aquatic environment. BPJ is used in cases where effluent limitations guidelines are not available for a particular pollutant parameter.